WHAT IS CLAIMED AS NEW AND IS DESIRED TO BE SECURED BY LETTERS
PATENT OF THE UNITED STATES IS:

1. A defect inspection apparatus comprising:

a first processor unit configured to create at least one of a binary expansion data and a
multivalued expansion data by expanding a design data and obtaining one of a complex
transmission distribution data and a complex reflection distribution data of a test substrate;

a second processor unit configured to calculate a reference data by using one of said
complex transmission distribution data and said complex reflection distribution data passed
through multiple complex coefficient finite impulse response filters; and

a comparator unit configured to compare a scanned image data with said reference
data.

2. The apparatus of claim 1, wherein said pattern is a multi-layer pattern and said first
processor unit is operable to create said expansion data by expanding said design data of each
layer of said multi-layer pattern.

3. The apparatus of claim 1, wherein said first processor unit is operable to obtain one
of said complex amplitude transmission distribution data and said complex amplitude
reflection distribution data by executing multiplication and addition of said expansion data
and one of a complex amplitude transmission coefficient and complex amplitude reflection
coefficient respectively.

4. The apparatus of claim 1, wherein said second processor is configured to perform
multiplication with a conjugate complex number of one of said complex transmission
distribution data and said complex reflection distribution data after passing through said
complex coefficient finite impulse response filter.

5. The apparatus of claim 2, wherein if a plurality of patterns overlap each other in
the design data of said plurality of layers to form at least one overlapping part, said at least
one overlapping part is removed.

6. The apparatus of claim 1, wherein said comparator unit is configured to compare said scanned image data with said reference data sequentially on a per-pixel basis.

7. The apparatus of claim 1, wherein said reference data is obtained with respect to all surfaces of said test substrate on an all-at-a-time basis.

8. The apparatus of claim 1, wherein said reference data is obtained with respect to a pixel immediately before a pixel to be compared.

9. The apparatus of claim 1, wherein said expansion data is such that a ratio of a pattern occupying more than one pixel at a transmission portion is obtained by at least one of a binary and a multivalued expansion data.

10. The apparatus of claim 1, wherein said first processor unit performs a logical operation.

11. A defect inspection method comprising the steps of:
creating at least one of a binary expansion data or multivalued expansion data by expanding a design data;
obtaining one of a complex transmission distribution data and a complex reflection distribution data of a test substrate;
calculating a reference data by using one of said complex transmission distribution data and said complex reflection distribution data passed through multiple complex finite impulse response filters; and
comparing a scanned image data with said reference data.

12. The method of claim 11, wherein said pattern is a multi-layer pattern and wherein said step of creating comprises expanding said design data of each layer of said multi-layer pattern.

13. The method of claim 11, wherein said step of obtaining comprises performing multiplication and addition of said expansion data and one of a complex amplitude

transmission coefficient and complex amplitude respectively.

14. The method of claim 11, wherein said step of calculating comprises performing multiplication with a conjugate complex number of one of said complex transmission distribution data and said complex reflection distribution data after passing through said complex coefficient finite impulse response filter.

15. The method of claim 12, wherein if a plurality of patterns overlap each other in the design data of said plurality of layers to form at least one overlapping part, said at least one overlapping part is removed.

16. The method of claim 11, wherein said step of comparing comprises sequentially comparing on a per-pixel basis.

17. The method of claim 11, wherein said reference data is obtained with respect to all surface of said test substrate on an all-at-a-time basis.

18. The method of claim 11, wherein said reference data is obtained with respect to a pixel immediately before a pixel to be compared is obtained.

19. The method of claim 11, wherein said expansion data is such that a ratio of a pattern occupying more than one pixel at a transmission portion is obtained from a binary or multivalued data.

20. The method of claim 11, wherein said step of creating comprises performing a logical operation.

21. A computer readable medium containing program instructions for execution on a computer system, which when executed by the computer system, cause the computer system to perform the method recited in any one of claims 11-20.